



PhD Position

« Integration of Biorefinery in Cellulose Pulp Mills for the Valorization of Hemicelluloses »

Summary of the project

The PhD thesis is part of a large CMA (*Compétences et Métiers d'Avenir*) education and research project, financed by "France 2030", named BIORAF, aiming to develop an educational program on biorefineries integrating biotechnologies, with the collaboration of Clermont Auvergne INP, two industrial partners, two competitiveness poles and one CMQ (*Campus des Métiers et des Qualifications*).

Cellulose pulp mills are good candidates for the development of wood based biorefineries, as these industries already fractionate wood to valorize cellulosic fibers for multiple applications (paper, board, textile fibers, specialty celluloses, ...), by using a very efficient process, the Kraft process. The two other main components of wood, lignin and hemicelluloses, are currently dissolved in the effluent of the Kraft process and burnt, which makes self-sufficient in energy and in most cases, even net producers of green energy.

Wood hemicelluloses, representing 20 to 30% in wood mass, are small heteropolysaccharides of polymerization degree of 100-200, composed of different saccharides, that can contain substituents and lateral groups, representing a potential source of high-value oligo and monosaccharides.

LGP2 has worked for more than ten years on the extraction, characterization and valorization of wood hemicelluloses (for example as surface active agents, prebiotics, and alcoholic fermentation).

The objective of this PhD thesis is to combine chemical and enzymatic processes to modulate the degree of polymerization, the chemical composition and the functional groups of hemicelluloses extracted from wood.

Location and practical aspects

During the 3 years of the thesis, the PhD student will work under the supervision of Professor Christine Chirat, Associate Professor Catalina Quesada at [LGP2](https://lgp2.grenoble-inp.fr/en), the Laboratory of Process Engineering for Biorefinery, Bio-based Materials and Functional Printing (LGP2, Grenoble INP, France, <https://lgp2.grenoble-inp.fr/en>), who have an expertise in vegetal biomass chemistry and biorefinery processes. This research project is led in collaboration with the 4Bio - GePEB research team from Institut Pascal in Clermont Ferrand (<http://www.institutpascal.uca.fr/index.php/en/presentation-gepeb/60-gepeb/516-4bio-eng>)

The project is financed by ANR and the PhD student will be hired by Grenoble INP. The gross salary will be approximately 2200 €/month.

If the PhD student is interested in doing so, it will be possible to give lectures and supervise students' projects in the frame of the BIORAF project.

Date of PhD start: September or October 2025.

Applicant qualifications

The candidate should have an Engineer Diploma or a Master degree and a solid knowledge in wood chemistry and biorefinery processes and experience in analytical chemistry of saccharides. Experience with enzymatic processes is highly appreciated. The candidate should have a strong aptitude for experimental work, should be able to work in a research team and also be able to work in autonomy. Oral and writing skills are also required.

How to apply?

Send your CV, a motivation letter, and the engineering school (second and third year) or master (two years) transcripts (marks) to christine.chirat@grenoble-inp.fr and to maria.quesada-salas@pagora.grenoble-inp.fr

The position will be filled as soon as a suitable candidate is found.